HERPETOFAUNA OF FOUR REMNANT BUSHLAND ISOLATES IN THE CITY OF NEDLANDS, PERTH

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ABSTRACT

The herpetofaunas of four small, isolated remnant bushlands and a nearby urban garden in metropolitan Perth are documented. Shenton Bushland (21 ha.) was sampled over eleven consecutive years between 1994 and 2005 and 22 species (4 frogs, 3 snakes and 15 lizards) were recorded. Underwood Avenue Bushland (31 ha) was sampled over two years – 1998/1999 and 2000/2001 and 20 species (3 frogs, 3 snakes and 14 lizards) were recorded. Hollywood Reserve (6.5 ha) was sampled in 2001/2002 and 10 species (1 snake and 9 lizards) were recorded. A small, unnamed bushland isolate on Monash Avenue (0.75 ha), was sampled in 2001/2002 and 4 lizard species were recorded. Five lizard species were recorded from the urban garden over a 26 year period. No species differing from those on the Shenton Bushland list was recorded at the other bushlands. Thirteen of the 18 reptile species recorded (72%) are entirely dependent on native bushlands, as is the Turtle Frog (*Myobatrachus gouldii*), one of four frog species recorded. Clearly these urban bushland fragments play an important role in preservation of the biodiversity in the western suburbs of Perth. Trapping effort at Shenton Bushland was 20,628 trap-days over 10 consecutive years before the gecko, *Strophurus spinigerus*, was recorded 597 days (5 years) after it had been assumed that 100% of the assemblage at Shenton Bushland had been recorded.

INTRODUCTION

Two decades ago Hopkins and Saunders (1987) stressed the need for ecological studies to provide empirical data on the role of remnant bushlands in the conservation of native biota. Others pointed out that the Banksia woodlands of the Swan Coastal Plain were diminishing rapidly in area, yet had been neglected scientifically and urgently required study to achieve conservation goals and

to develop management strategies (e.g. Hopper and Burbidge 1989; Hopkins and Griffin 1989; How and Dell 1993).

Despite the rapid pace of development in the Perth metropolitan area, only a small number of systematic studies of the vertebrate assemblages of urban bushland remnants have been published to date (e.g. Cooper 1995; How 1998; How and Dell 1989; Maryan 1993; Turpin 1991). As an illustration of this deficiency in documentation, of 58 bushland sites from the Spearwood dune system assessed in 'Perth's Bush Forever' (Anon. 2000), 34 (59%) had no records of the fauna.

Results to date suggest that even small urban reserves are valuable for preserving reptile assemblages (How and Dell, 2000) and the composition of the fauna depends in part on major geographical features such as dune formation and position relative to the Swan River (How and Dell 1994). However, the high trapping efforts required to record some species (e.g. 12 years for *Pletholax gracilis* in Bold Park, How pers. comm. and eleven years in this study for *Strophurus spinigerus* in Shenton Bushland) suggests that knowledge of herpetofaunal assemblage distributions in the Perth metropolitan area may still be incomplete.

In this study we describe the herpetofauna of four urban bushland remnants, none of which is more than 900m from its nearest neighbour. Shenton Bushland (21 ha), an A Class Reserve, was sampled over 11 consecutive years between 1994 and 2005. Underwood Avenue Bushland (31 ha), owned by the University of Western Australia, was sampled over two years – 1998/1999 and 2000/2001. Hollywood Bushland (6.5 ha), a C Class Reserve, was sampled in 2001/2002. An unnamed isolate on Monash Avenue (0.75 ha), referred to as the Hospital Bushland and owned by the Sir Charles Gairdner Hospital, was sampled in 2001/2002. In addition, herpetofauna records over 26 years from a nearby urban garden are available. These four remnants and the garden are situated between two of Perth's major bushlands – Kings Park (321 ha) and Bold Park (362 ha). We show that urban bushland fragments in the Perth metropolitan area support diverse herpetofaunal assemblages compared to a suburban garden. This result highlights the critical role of urban bushlands for the preservation of faunal biodiversity in the region.

STUDY SITES

All four study sites are on aeolian sands of the Spearwood Dune system and none has free-standing water. They are representative of the Karrakatta Central and South vegetation complex of predominantly open forest and low woodland of *Eucalyptus gomphocephala* – *E.*

marginata – *Corymbia calophylla* and woodland of *E. marginata* – *Banksia* species. According to Perth's Bush Forever, 18% of this complex remains as native vegetation on the Spearwood Dunes in Perth Metropolitan Region (Anon. 2000).

The Shenton Bushland (an A class reserve vested in the City of Nedlands in 1996) covers an area of 20.9 ha, of which 19.7 ha is bushland. However, adjacent bushland on State and Commonwealth property along two of its borders makes the area an effectively larger bushland remnant. It is situated on a ridge (max. height 34m AHD) and is approximately half way between Perth's two largest inner urban bushlands – Kings Park and Bold Park (Figure 1).

Prior to its vesting, parts of Shenton Bushland were severely degraded by the dumping of rubbish and weed invasion, whilst other parts were in

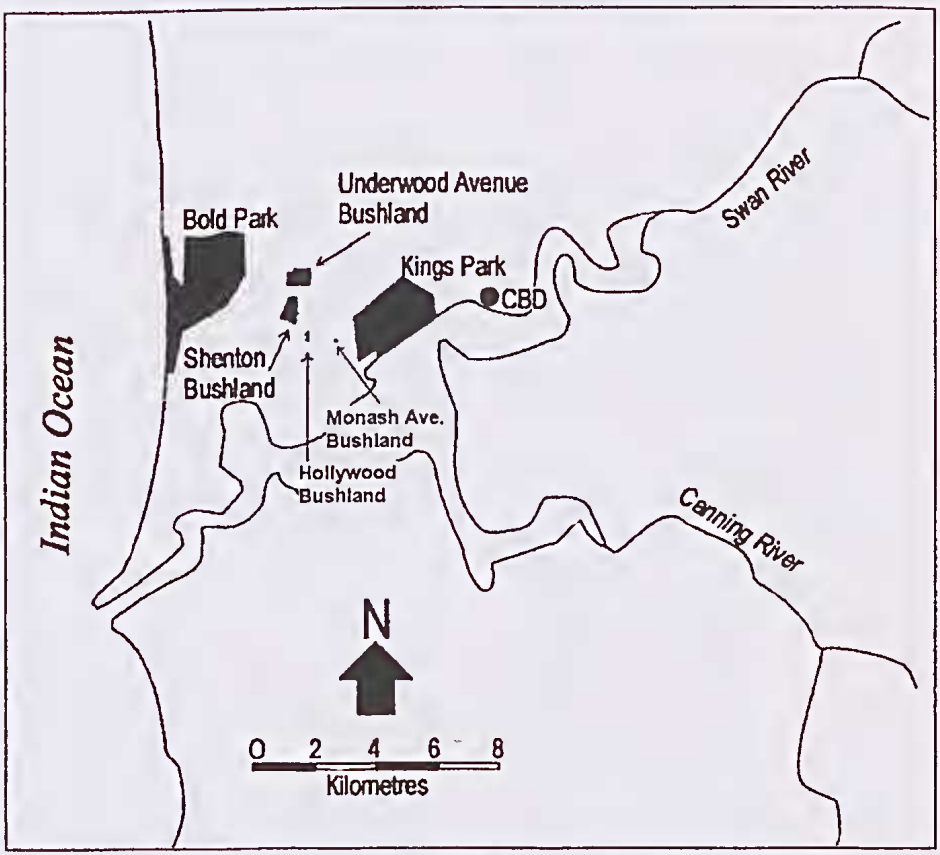

Figure 1. Positions of Bold Park, Kings Park, Underwood Avenue Bushland, Shenton Bushland , Hollywood Reserve and Monash Bushland.

relatively good condition (Anon. 1996). Perth's Bush Forever rates the vegetation condition as >50% Very Good to Excellent; <50% Good to Degraded with areas of severe localised disturbance (Anon. 2000). Prior to commencement of this study this bushland had not had a major fire for at least a decade; there was a small fire along the northern border in 1992 (Don King pers. comm.). The most recent fire burned approximately 65% of the reserve during the study in 1997. Few large *E. gomphocephala* (Tuart) remain alive and most large *E. marginata* (Jarrah) have been cut out. Significant rehabilitation, particularly weed reduction, has been undertaken continuously by the Nedlands City Council and the Friends of Shenton Bushland Inc. since 1994.

The Underwood Avenue Bushland is owned by the University of Western Australia which plans to subdivide it for a housing development. It covers an area of 32.1 ha, of which 31.5 is remnant native vegetation and is situated approximately 600 metres directly north of the Shenton bushland. Small fragmented areas of native vegetation persist on private property between the two bushlands. Perth's Bush Forever rates the vegetation condition as >50% Very Good; <50% Good to Degraded with areas of severe localised disturbance (Anon. 2000). In 1998/99 and 2000/01 (when the fauna surveys were undertaken) this bushland, although structurally similar to Shenton Bushland, was characterised by having generally larger and more abundant Jarrah and more large living Tuarts, providing a denser eucalypt canopy, as well as extensive thickets of *Banksia prionotes*. The last fire prior to the sampling for this study was in January 1988 (Don King pers. comm.). A fire in January 2002, which burnt approximately 95% of Underwood Bushland severely damaged those thickets surveyed.

The Hollywood Reserve is a 6.5ha bushland remnant bordered by Karrakatta cemetery, except for the south and north-east sides of the reserve where there are suburban roadways. It is managed by the City of Nedlands and the Friends of Hollywood Reserve Inc. The fauna and vegetation have been described by Cousin *et al* (2000) on the basis of a 3 week survey in December 1999. Weed control as well as replanting of non-local native plants has occurred in this reserve. Frequent small fires have also contributed to its degradation.

The Hospital Bushland is a remnant of approximately 0.75 ha of *E.marginata/Banksia* woodland owned by the Sir Charles Gairdner Hospital. Apart from moderate weed invasion, its vegetation and floristics appear to be typical *E.marginata/Banksia* woodland and in moderately good condition, though they have not been described. In 2001 the University of Western Aus-

tralia built a new dental school to the east of the bushland which has reduced insolation. Subsequent to the building activity the Hospital has undertaken some rehabilitation work and restricted public access.

The urban garden, on a 1000m^2 block, has been cleared of natural vegetation for at least 70 years.

SAMPLING

Animals were captured using 20L plastic bucket pit traps (dimensions 30 x 50 cm) with 4m long, 30cm high flywire mesh drift fences. Checks of pitfall traps were made daily and animals released at their point of capture after identification and measurement. High trapping efforts were used as How (1998) has shown that an intensive trapping program of over 960 pit-days was necessary to record at least 80% of the herpetofaunal assemblage in Bold Park. Coordinates of pitfall traps are listed in Table 3. Herpetofauna from the urban block were recorded opportunistically by P.F.B. from swimming pool casualties and opportunistic captures since 1981.

Shenton Bushland

Two sites were sampled using pit-traps. At each site traps were arranged as 3 x 3 trap grids with traps spaced *ca.* 5m apart. Trapping began in 1994 and was continued during the spring, summer and autumn months (September to March) until 2005. Total number of days trapped over this 11 year span was 1230. Site One, at the highest point of the bushland, was characterised by a thicket of *Dryandra sessilis* that became progressively more mature and dense over the study period. This site was not burnt in the 1996 fire, but was sprayed the same year with herbicide which eliminated perennial veldt grass (*Ehrharta calycina*). Site Two was selected as being typical of the *Eucalyptus-Banksia* woodland. It was burned in 1996 which also had the effect of reducing veldt grass.

Underwood Avenue Bushland

Two sites were sampled using pit traps. Traps were arranged as two line transects, one of 9 traps and one of ten traps, with traps spaced *ca.* 10 metres apart. Trapping was continuous from 7 October 1998 to 14 March 1999 (149 days) and 10 September 2000 to 25 February 2001 (155 days). Line 1 ran parallel to Selby Street through a low, flat area of sparse Eucalyptus-Banksia woodland overlying heath. The second line ran up the slope parallel to Underwood Avenue through dense *Eucalyptus-Banksia* woodland and included *Banksia prionotes* thicket.

Hollywood Reserve

Ten pit traps were used, 5 in the northern and 5 in the southern sectors of the reserve. The traps were located as close as possible to positions used and mapped by Cousin *et al* (2000) in their 1999

Table 1. Herpetofauna recorded from the Shenton Bushland (SHB) between 1994 and 2005, the Underwood Avenue Bushland (UAB) in 1998/1999and 2000/2001, Hollywood Reserve (HR) in 2000/2001 and Monash Avenue Bushland (MAB) in 2000/2001. Also shown is the herpetofauna recorded from Kings Park (KP) (data from How and Dell 2000 and unpubl.), and Bold Park (BP) (data from How 1998 and How and Dell 2000).

SPECIES	SITE					
REPTILES	SHB	UAB	HR	MAB	BP	KP
Skinks (Scincidae)						
Cryptoblepharus plagiocephalus	116	25	23	-	27	37
Ctenotus fallens	515	239	32	1	463	756
Ctenotus australis	171	36	-	-	59	62
Cyclodomorphus celatus	-	-	-	-	12	3
Hemiergis quadrilineata	503	342	37	4	998	164
Lerista elegans	61	95	28	-	176	26
Lerista lineopunctulata	-	-	-	-	164	40
Lerista praepedita	7	13	2	-	17	14
Menetia greyii	107	54	58	23	40	185
Morethia lineoocellata	-	-	-	-	1	1
Morethia obscura	142	80	-	-	2	21
Tiliqua rugosa	32	8	5	-	43	6
Legless Lizards (Pygopodidae)						
Aprasia repens	86	37	28	7	19	72
Lialis burtonis	41	13	-	-	84	15
Gekkos (Gekkonidae)						
Diplodactylus alboguttatus	-	-	-	-	1	-
Diplodactylus polyophthalmus	-	-	-	-	-	1
Strophurus spinigerus	1	-	-	-	114	-
Christinus marmoratus	55	8	9	-	-	24
Dragons (Agamidae)						
Pogona minor	28	23	-	-	32	69
Rankinia adelaidensis	-	-	-	-	19	-
Monitors (Varanidae)						
Varanus gouldii	5	1	-	-	4	2
Varanus tristis	-	-	-			1
Blind Snakes (Typhlopidae)						
Ramphotyphlops australis	29	22	1	-	27	8
Fixed Front-Fanged Snakes (Elapidae)						
Pseudonaja affinis	6	2	-	-	1	1
Simoselaps bertholdi	28	9	-	-	122	3
Simoselaps bimaculatus	-	-	-	-	10	3
Simoselaps calonotus	-	-	-	-	16	-
Simoselaps fasciolatus	-	-	-	-	7	-
Simoselaps semifasciatus	-	-	-	-	22	-
Subtotal reptile taxa	18	17	10	4	26	23
Subtotal reptile individuals	1933	1007	223	35	2480	1514

Table 1 (cont.)

SPECIES	SITE					
	SHB	UAB	HR	MAB	BP	KP
AMPHIBIANS						
Crinia insignifera	1	-	-	-	-	-
Heleioporus eyrei	42	1	-	-	71	-
Limnodynastes dorsalis	4	5	-	-	146	-
Myobatrachus gouldi	97	45	-	-	25	5
Subtotal amphibian taxa	4	3	0	0	3	1
Subtotal amphibian individuals	144	51			242	5
Total number of species trapped	22	20	10	4	29	24
Total number of individuals	2258	1058	223	35	2722	1519
Total days trapped	1230	290	123	123	398	173
Total number of trap-days	22140	5510	1230	246	9552	8703
Individuals/10 trap-days	1.02	1.92	1.81	1.42	2.85	1.75

study. Trapping was undertaken between the 16 September 2001 and 29 February 2002 (123 days).

Monash Avenue Bushland

Two pit traps were used. Trapping was undertaken between 16 September 2001 and 29 February 2002 (123 days).

RESULTS

Species Richness

A total of 22 herpetofauna species was recorded in this study, comprising 18 reptile and 4 frog taxa. Apart from one additional gecko species (*Strophurus spinigerus*) and one additional frog species (*Crinia insignifera*) recorded at Shenton Bushland, the same 17 species of reptiles and 3 species of frogs were recorded at Underwood Avenue Bushland. No frogs were recorded from the Hollywood and the Hospital Bushlands where the reptile taxa were reduced to 10 and 4 species respectively, all of which also occur in Shenton and Underwood Avenue Bushlands (Table 1).

The urban garden in the vicinity of the bushlands contained only 5 lizard species – 4 skinks (*H. quadrilineata, M. greyii, C. plagiocephalus, L. elegans*) and 1 gecko (*C. marmoratus*).

Reptiles

Catch per unit of effort for the herpetofauna taxa recorded in all the bushlands is presented in Table 2. Over the eleven consecutive years sampled at Shenton Bushland, by far the most captures were of the skinks *Ctenotus fallens* and *Hemiergis quadrilineata*. With fewer captures, but recorded in all eleven years sampled were

Aprasia repens, *Ctenotus australis*, *Cryptoblepharus plagiocephalus*, *Lialis burtonis*, *Lerista elegans*, *Menetia greyii*, *Morethia obscura*, *Christinus marmoratus*, *Simoselaps bertholdii*, and *Tiliqua rugosa*. *R. australis* was recorded in ten of the eleven years sampled. Least captures, and recorded irregularly over the period sampled (number of years in brackets) were of *Pogona minor* (8), *Lerista praepedita* (6), *Pseudonaja affinis* (5) and *Varanus gouldii* (1). The gecko, *Strophurus spinigerus*, (1) was only recorded in the eleventh year at Site 1 which is in a maturing *Dryandra sessilis* thicket.

The capture rate for most species in the Underwood, Monash and Hospital bushlands was approximately twice those recorded for Shenton Bushland in the same years (Tables 1 and 2). *C. fallens* and *H. quadrilineata* were the most frequently captured species in Shenton and Underwood Bushlands, but *A. repens* and *M. greyii* were the most frequently captured species in Hollywood and Monash Avenue Bushlands.

One hundred and fifteen days (2070 trap days) elapsed before 80% of the Shenton Bushland herpetofauna was recorded, whereas only 19 days (361 trap days) were required to achieve this at Underwood Avenue Bushland (However, if *Varanus gouldii* is excluded, the effort to achieve 100% of the species in common was similar at Shenton and Underwood Bushlands (3816 and 3834 trap days respectively).

Frogs

The Turtle Frog *M. gouldii*, the most frequently captured frog, was recorded in all eleven years sampled in Shenton Bushland. *H. eyrei* (9 years) and *L. dorsalis* (6 years) were recorded in low numbers and all were sub-adults, while only a single specimen of *C. insignifera* was recorded (Table 2). Presumably these latter three taxa were dispersing from nearby water bodies where breeding had occurred. Of the frogs recorded, only the Turtle Frog *M. gouldii* is resident and breeds in Shenton and Underwood Bushlands. Its distribution within these bushlands shows a clear preference for the crests of ridges. At Shenton Bushland 123 (95%) of a total of 130 specimens captured were at Site One, the higher of the two sites. At Underwood Avenue Bushland 100% of specimens (45 individuals) were recorded at Line 2 in which the traps represented a transect from the bottom to the top of a ridge. 50 % of the specimens recorded were in the top two pit-traps towards the ridge crest. No specimens were captured at Line 1, which runs along a swale.

DISCUSSION

The vertebrate fauna of the majority of urban bushland remnants on the Spearwood dune system has received little or no study (Anon 2000). This limits our understanding of the distribution of species on the Swan Coastal Plain, and the role that

bushland fragments play in preserving regional biodiversity. We conducted a long-term trapping study to document the herpetofauna of urban bushland fragments within the western metropolitan region of Perth. We show that bushland fragments contain biodiverse herpetofaunal assemblages, and the majority of these species do not occur in urban gardens.

The importance of long-term trapping effort to adequately document herpetofaunal assemblages is well accepted (e.g. How 1998, Thompson *et al.* 2007). How (1998) recorded 80% of the herpetofaunal assemblage at Bold Park after 960 pit-days (40 days over 2 years) and 100% of the fauna was assumed to have been reached after 4,512 pit-days (188 days over 4 years), there being no additions for 5,040 additional pit-days (210 days over 3 years) thereafter. However, this assump-tion was negated by the sub-sequent recording of the legless lizard *Pletholax gracilis* after 12 years (How pers. comm.). Similarly, with the trapping effort at Shenton and Underwood Avenue Bushlands (20,628 trap-days over 10 years and 5,510 trap-days over two years respectively) it seemed unlikely that additions would be made to the herpetofaunal assemblages until the gecko, *Strophurus spinigerus*, was recorded at Shenton Bushland after 11 years. This was 597 days (5 years) after it had been assumed that 100% of the assemblage at Shenton Bushland had been recorded and may reflect habitat changes that have occurred over time (maturation of the *Dryandra sessilis* thicket and protection since reserve status was acquired). However, it also may also be because the taxon is extremely uncommon or very untrappable This record further demonstrates that uncommon species, which are often the focus of conservation and management strategies (e.g. Milne *et al.* 2000), may be missed by short term or low intensity surveys. A more detailed analysis of our catch per effort results, including an additional year of sampling will be presented elsewhere (O.F. Berry and P.F. Berry in prep.).

The Turtle Frog *M. gouldii* is clearly dependant on persistence of native bushland for its survival in the Metropolitan area. Within these bushlands its apparent preference for high ground towards the crest of ridges needs to be taken into account. Although recorded at low levels of abundance, the other frog species recorded may benefit from native bushlands for feeding and as dispersion corridors.

In addition to the species recorded in this study, ten reptile species – two skinks, (*Cyclodomorphus celatus and Lerista lineopunctulata*), one agamid (*Rankinia adelaidensis*), two geckos (*Diplodactylus alboguttatus and Diplodactylus polyophthalmus*), one varanid (*Varanus tristis*) and four elapid snakes (*Brachyurophis*

Table 2. Comparison of catch per unit of effort (trap nights x1000) at Shenton Bushland (SHB), University Bushland (UAB), Hollywood Reserve (HR) and Monash Avenue Bushland (MAB) by species October to March. Shaded cells denote where taxa were more abundant than the maximum recorded at Shenton Bushland
NB MEAN IS NO/ TRAP NIGHT (X1000) Trap days exclude Sept – ie Oct-March

	1994/95 to 2004/05 SHB Mean± s.d. (range)	1998/1999 SHB	UB	2000/2001 SHB	UAB	2001/2002 SHB	HR	MAB
Aprasia repens	3.42 ± 1.90 (0-6.31)	5.05	4.59	3.85	7.69	2.19	22.05	27.56
Ctenotus fallens	30.69 ± 15.02 (7.72-66.80)	18.76	40.62	39.32	50.20	23.62	25.2	3.94
Ctenotus australis	10.07 ± 4.66 (3.61-18.99)	3.61	8.48	10.26	4.45	8.75	0.00	0.00
Cryptoblepharus plagiocephalus	5.89 ± 3.66 (0-13.51)	9.38	3.89	5.98	4.86	5.25	18.11	0.00
Christinus marmoratus	3.24 ± 2.42 (0-8.44)	1.44	2.47	2.56	0.40	4.37	7.09	0.00
Hemiergis quadrilineata	26.33 ± 8.85 (15.47-46.55)	33.19	74.53	24.79	48.99	28.87	29.13	15.75
Lialis burtonis	2.21 ± 1.54 (0.42-4.7)	1.08	2.47	4.7	2.43	2.19	0.00	0.00
Lerista elegans	3.65 ± 2.78 (0.83-10.16)	3.25	18.37	2.99	14.98	1.31	22.05	0.00
Lerista praepedita	0.47 ± 0.89 (0-3.00)	0.36	2.12	0.43	2.83	0.44	1.57	0.00
Menetia greyii	6.15 ± 3.29 (2.19-12.35)	3.61	9.54	5.13	8.10	2.19	45.67	90.55
Morethia obscura	7.43± 4.52 (3.73-19.71)	8.30	15.19	6.84	12.15	5.25	0.00	0.00

Pseudonaja affinis	0.25± 0.41 (0-1.28)	0	0	1.28	0.8	0.44	0.00	0.00
Pogona minor	1.85± 1.65 (0-5.29)	0	5.30	2.56	2.83	2.19	0.00	0.00
Ramphotyphlops australis	2.02 ± 1.85 (0-6.61)	2.89	6.00	0.43	1.62	0.87	0.79	0.00
Simoselaps bertholdii	1.30 ± 0.73 (0-2.53)	2.53	1.06	1.71	2.02	2.19	0.00	0.00
Tiliqua rugosa	1.38 ±1.09 (0-3.25)	3.25	0.71	2.56	2.02	0.44	3.94	0.00
Varanus gouldii	0.19 ± .63 (0-2.07)	0	0	0	0.4	0	0.00	0.00
Total reptiles	**107.25 ± 20.67 (80.25-145.65)**	96.68	195.34	115.38	166.80	90.55	175.59	137.80
Helioporus eyrei	2.11 ± 1.99 (0-5.97)	1.80	0.35	0	0	3.94	0	0
Limnodynastes dorsalis	0.18 ± 0.26 (0-0.70)	0	1.77	0	0	0	0	0
Myobatrachus gouldii	4.70 ± 3.26 (0-10.80)	9.62	9.54	7.26	3.64	4.37	0	0
Total frogs	**9.32 ± 5.85 (1.41-21.10)**	10.82	11.66	7.26	3.64	8.31	0	0

fasciolatus, Brachyurophis semifasciatus, Echiopsis curta, Neelaps bimaculatus, Neelaps calonotos,) have been recorded from nearby Bold Park and Kings Park (How and Dell, 2000; How pers.com.). *Egernia napoleonis* is also stated to occur in Banksia woodland with emergent *Xanthorrhoea* on the Swan Coastal Plain (Bush *et al.* 1995). The possibility that some of these taxa may subsequently be recorded, particularly at Shenton Bushland and Underwood Bushland, cannot be discounted.

The reduced herpetofaunas recorded from Hollywood Reserve and Monash Avenue Bushlands are likely to reflect an impoverished representation of the original assemblage, probably as a result of their smaller areas. The incised shape of Hollywood Reserve gives it a high perimeter: area ratio. However, the contiguous Karrakatta Cemetery (60 ha approx.) probably contributes to the viability of the Reserve. Failure to record *C. plagiocephalus* and *C. marmoratus*, both arboreal species (common in Shenton and Underwood Avenue bushlands), at Monash Avenue Bushland probably reflects positioning of the two pits rather than a real absence.

Varanus gouldii, a top reptilian predator, is now rare in Kings Park. However, Thompson (1996) records capturing 35 different individuals in Karrakatta Cemetery (which is contiguous with Hollywood Reserve) between 1990 and 1992. If this apparently large population persists, the cemetery is probably a source of recruitment for the adjacent bushlands, and should be regarded as an important part of the 'corridor' linking the Kings Park with the Bold Park populations. Road kills in the area are evidence of the mobility of *V. gouldii* (P. Berry, pers obs). The specimens recorded in Shenton and Underwood Bushlands were all hatchlings indicating local breeding. However, only a single adult was sighted during this study (in Shenton Bushland).

The lower overall catchability of herpetofauna at Shenton Bushland compared with the other study sites described here appears to reflect a genuine difference in abundance at a community level, in view of the direct comparisons at species level in terms of directly comparable effort and sampling at the same times in the same years (Table 2). Fire history, particularly immediately prior to the studies might be expected to influence abundance and hence catch. However, our trapping at Underwood Avenue Bushland occurred after a decade had elapsed since the severe fire of 1988. Shenton Bushland does not appear to have experienced a fire of such intensity for a much longer period, nor did the fire of 1996 have any detectable effect on subsequent catch. Other unknown habitat factors must therefore be responsible. This is also apparently the case at Hollywood Reserve where *M. greyii, L. elegans, C. plagiocephalus*

Table 3. Coordinates of central pit traps of grids in Shenton Bushland (SHB), first and last pit traps in trap lines in Underwood Avenue Bushland (UAB) and pit traps at Monash Avenue Bushland (MAB).

Bushland	Site 1	Site 2
SHB	S 31° 57 48.0, E 115° 48 01.3	S 31° 57 48.1, E 115° 48 01.1
UAB	S 31° 56 55.8, E 115° 48 01.7 to S 31° 56 58.0, E 115° 48 12.1	S 31° 57 48.6, E 115° 48 01.1 to S 31° 56 56.8, E 115° 48.00.2
MAB	S 31° 58 11.6, E 115° 48 52.6	S 31° 58 11.0, E 115° 48 19.8

and *A. repens* were relatively much more abundant than at Shenton or Underwood bushlands and at Monash Avenue Bushland, where this was also the case for *M. greyii*, and *A. repens*. It appears that heavy weed infestation, particularly of perennial veldt grass (*Ehrharta calycina*) with its tussock growth form, is not necessarily deleterious to many of the reptile species recorded, at least not in the short term. This is concordant with the finding by Garden *et al.* (2007) that there may be a positive association between occurrence of certain reptile species and a moderate amount of weed cover in urban bushland isolates. If the assemblage of five reptile species recorded from the urban garden in the vicinity of the bushlands is representative, the remaining 13 reptile species (72%) are apparently entirely dependent on native bushlands.

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